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(दूसरा पुनरीक्षण)

Indian Standard

ROAD VEHICLES — FUSE-LINKS

PART 1 DEFINITIONS AND GENERAL TEST REQUIREMENTS

(Second Revision)

ICS 43.040.10

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

August 2012 **Price Group 5**

Automotive Electrical Equipments and Instruments Sectional Committee, TED 11

NATIONAL FOREWORD

This Indian Standard (Part 1) (Second Revision) which is identical with ISO 8820-1 : 2008 'Road vehicles — Fuse-links — Part 1: Definitions and general test requirements' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Automotive Electrical Equipments and Instruments Sectional Committee and approval of the Transport Engineering Division Council.

This standard was first published in 1963 and revised in 1974 as IS 2577 : 1974 'Specification for cartridge fuse-links for automobiles (*first revision*)'. In this revision the standard has been thoroughly updated with respect to types, test requirements and user's guide. This standard has been brought out in seven parts. Other parts in this series are:

Part 2	User's guide
Part 3	Fuse-links with tabs (Blade type)
Part 4	Fuse-links with female contacts (Type A) and bolt-in contacts (Type B) and their test fixtures
Part 5	Fuse-links with axial terminals (Strip fuse-links) Types SF 30 and SF 51 and test fixtures
Part 6	Single-bolt fuse-links
Part 7	Fuse-links with tabs (Type G) with rated voltage of 450 V

After publication of this standard, IS 2577 : 1974 shall be treated as withdrawn.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 6722 : 2006 Road vehicles — 60 V and 600 V single-core cables — Dimensions, test methods and requirements	IS/ISO 6722 : 2006 Road vehicles — 60 V and 600 V single-core cables —Dimensions, test methods and requirements	Identical
ISO 8820-2 : 2005 Road vehicles — Fuse-links — Part 2: User's guide	IS 2577 (Part 2) : 2012 Road vehicles — Fuse-links: Part 2 User's guide (*second revision*)	do
ISO 8820-3 : 2002 Road vehicles — Fuse-links — Part 3: Fuse-links with tabs (blade type)	IS 2577 (Part 3) : 2012 Road vehicles — Fuse-links: Part 3 Fuse-links with tabs (blade type) (*second revision*)	do

(*Continued on third cover*)

Indian Standard

ROAD VEHICLES — FUSE-LINKS

PART 1 DEFINITIONS AND GENERAL TEST REQUIREMENTS

(Second Revision)

1 Scope

This part of ISO 8820 defines terms and specifies general test requirements for fuse-links for electrical systems of road vehicles.

This part of ISO 8820 is intended to be used in conjunction with other parts of ISO 8820, to which its requirements are applicable except where modified by the particular requirements of another part.

This part of ISO 8820 is not applicable to fuse holders used in the vehicles.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6722, *Road vehicles — 60 V and 600 V single-core cables — Dimensions, test methods and requirements*

ISO 8820 (all parts), *Road vehicles — Fuse-links*

ISO 16750-3, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 3: Mechanical loads*

ISO 16750-5, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 5: Chemical loads*

IEC 60068-2-70, *Environmental testing — Part 2: Tests — Test Xb: Abrasion of marking and letterings caused by rubbing of fingers and hands*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
fuse
protective device that interrupts the circuit irreversibly when the current flow reaches a specified value for a specific time

NOTE The fuse is an assembly of all parts forming the protective device. This includes the fuse holder and the fuse-link.

3.1.1
fuse holder
device connecting the fuse-link to the vehicle wiring harness

3.1.2
fuse-link
interchangeable part of the fuse, consisting of an insulator and electrical conducting parts such as the terminals and the fuse element

3.1.2.1
insulator
electrical non-conductive mechanical support for the electrical conductive parts of the fuse-link

3.1.2.2
terminal
part of the fuse-link that makes the mechanical and electrical connection of the fuse-link to the fuse holder

NOTE The terminal includes contacts and tabs.

3.1.2.3
fuse-element
active part of the fuse-link which interrupts the current and opens the circuit permanently in the case of an over current

3.2
rated current
I_R
current used for identifying the fuse-link, according to specified tests

NOTE The continuous current is lower than the rated current.

3.3
rated voltage
U_R
maximum supply voltage for which the fuse-link is designed

3.4
voltage drop
U_D
voltage measured between specified measuring points at a specified current

3.5
breaking capacity
I_B
value of prospective breaking current a fuse-link is capable of breaking at rated voltage under prescribed conditions of use and behaviour

3.6
time constant
time required for a physical quantity to rise from 0 to 1 – 1/e (i.e. 63,2 %) of its final steady value when it varies with time, t, as $1 - 1^{-kt}$

3.7
operating time
time between the application of an over current and the moment when the current drops below a value, as specified in the appropriate part of ISO 8820

4 Marking, labelling and colour coding

The rated current and rated voltage shall be permanently marked to be externally visible on the fuse-link. In addition, the current rating shall be shown by colour coding as specified in the applicable part of ISO 8820.

The manufacturer's name, trademark and/or symbol shall be marked on the fuse-link insulator.

5 Tests and requirements

5.1 General

5.1.1 General test conditions

If not otherwise specified, all tests shall be done at room temperature (RT) (23 ± 5) °C, at a relative humidity (RH) of 45 % to 75 % (standard condition).

At the beginning of the electrical tests, a direct current shall be fixed at the rated value. Measure this current with an appropriate method. If not otherwise specified, no further adjustments during the tests are allowed.

All electrical measurement equipment shall have a tolerance of less than ± 2 %.

If not otherwise specified, the supply voltage shall not exceed the rated voltage of the fuse-link.

Mount the fuse-links in a test fixture as specified in the applicable part of ISO 8820, or any alternate fixture with equivalent electrical, mechanical and thermal properties.

Measurements shall be performed at no forced air flow.

For appropriate cable sizes, see the applicable part of ISO 8820.

Connections shall be made to the fuse-links with copper cables according to ISO 6722. The cable length between the test fixture and the rest of the test set-up shall be (500 ± 50) mm, if not otherwise specified.

Measure the connection resistance using a dummy with dimensions as specified in the appropriate part of ISO 8820. Use a current as specified in the appropriate part of ISO 8820 for this measurement.

5.1.2 General performance requirements

The general performance requirements are as follows:

- the marking and/or labelling shall remain legible;
- the colour coding shall remain recognisable;
- after testing, the fuse-link shall be removable in one piece from the test fixture by its intended method.

5.2 Voltage drop

5.2.1 Purpose

This test defines and measures the energy consumption of the fuse-link which creates a temperature rise.

5.2.2 Test

If not otherwise specified, this test shall be performed at rated current. Record the voltage drop measured at the points shown in the applicable part of ISO 8820, after the values are stabilized, i.e. the values do not change more than 2 % within a 10 min period.

5.2.3 Requirement

The maximum voltage drop shall not exceed the values given in the applicable part of ISO 8820.

5.3 Transient current cycling

5.3.1 Purpose

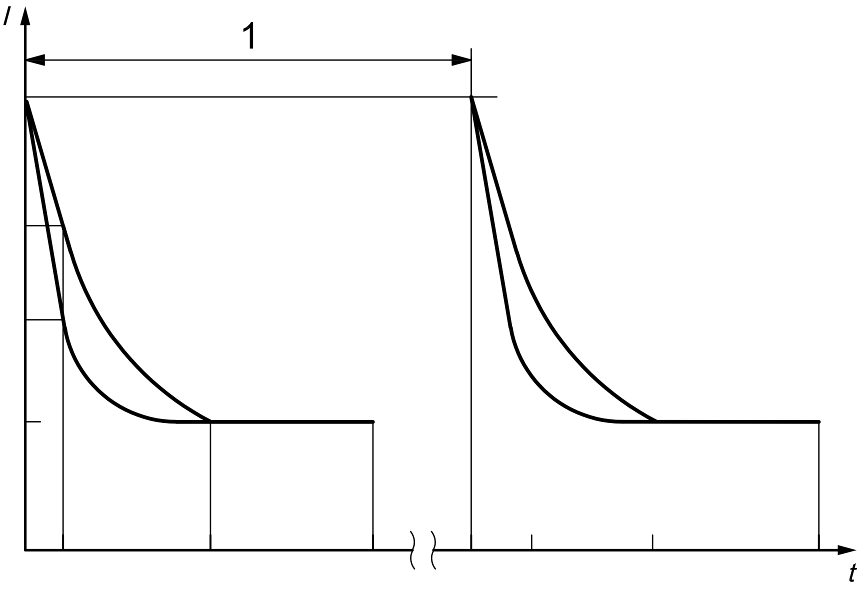
This test evaluates the ability of the fuse-link to withstand the energy volume of transient pulses.

5.3.2 Test

Apply a pulse as given in the appropriate part of ISO 8820.

5.3.3 Requirement

After transient current cycling for a minimum of 50 000 cycles, the fuse-links shall meet the requirements of the operating time rating test given in the applicable part of ISO 8820.



Key

I current

t time, in s

1 one cycle

Figure 1 — Transient current cycling

5.4 Environmental conditions

5.4.1 Purpose

These tests evaluate the ability of the fuse-links to function under environmental stresses.

5.4.2 Mechanical load

5.4.2.1 Test

If a mechanical load test is required, an appropriate test shall be chosen from ISO 16750-3 and agreed between fuse-link and vehicle manufacturer.

5.4.2.2 Requirement

After the mechanical load test, the fuse-links shall meet the requirements of the operating time rating test given in the applicable parts of ISO 8820.

5.4.3 Climatic loads

5.4.3.1 Temperature/humidity cycling

5.4.3.1.1 Test

Subject the fuse-links to a temperature/humidity cycling test as specified in Figure 2. The test sequence is as described below.

a) Maintain the samples at standard conditions for 4 h.

b) Increase t to (55 ± 2) °C at 95 % to 99 % RH within 0,5 h.

c) Maintain t at (55 ± 2) °C at 95 % to 99 % RH for 10 h.

d) Decrease t to (–40 ± 2) °C within 2,5 h; the humidity is uncontrolled.

e) Maintain t at (–40 ± 2) °C for 2 h; the humidity is uncontrolled.

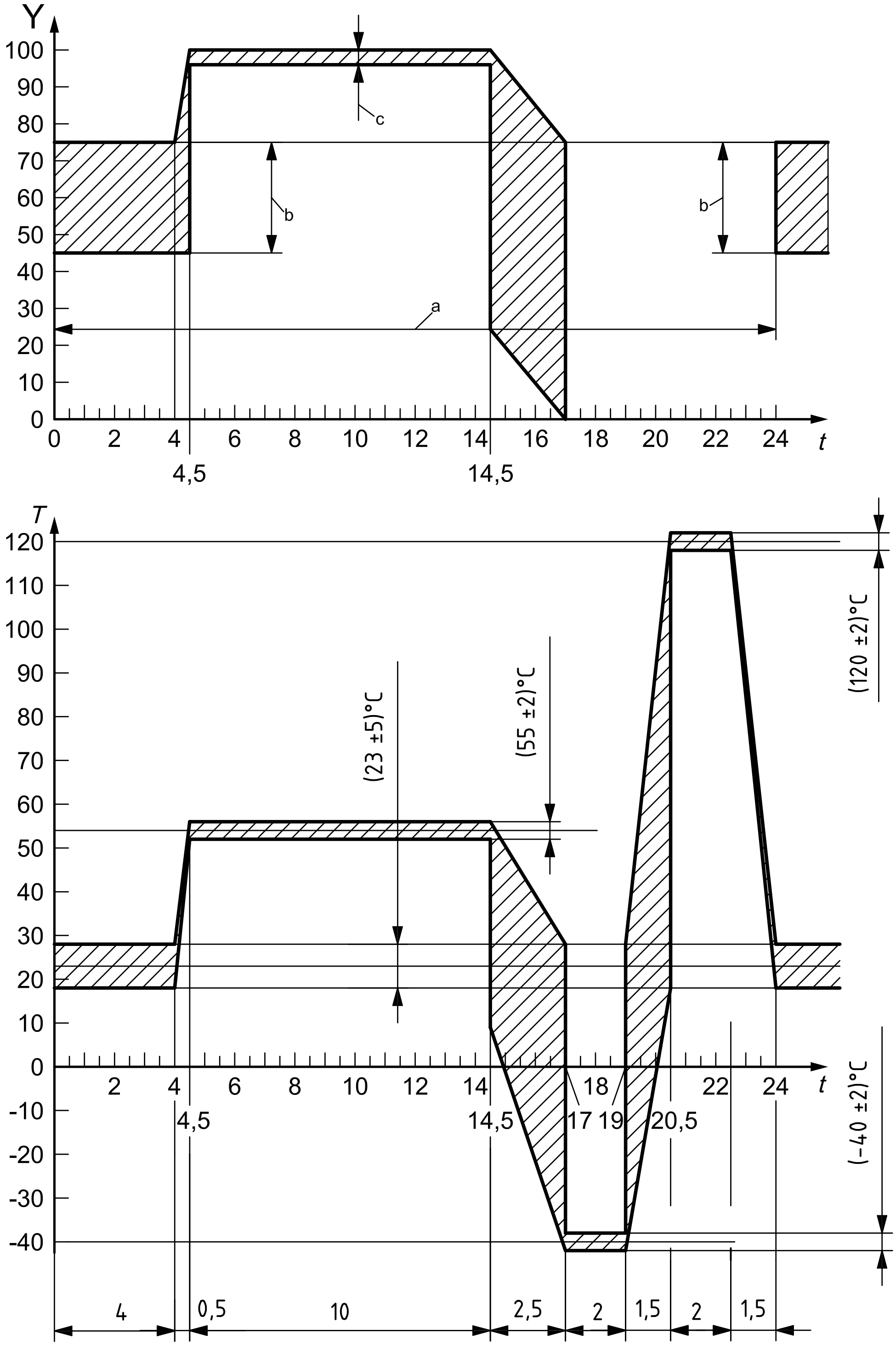
f) Increase t to (120 ± 2) °C within 1,5 h from (–40 ± 2) °C; the humidity is uncontrolled.

g) Maintain t at (120 ± 2) °C for 2 h; the humidity is uncontrolled.

h) Allow to return to RT within 1,5 h; the humidity is uncontrolled.

At the end of a cycle, the test may be interrupted. During the interruption, the test samples shall remain at the standard conditions. Note the interruption in the test report.

NOTE One cycle consists of 24 h.



Key

t time, in h

T temperature, in °C

Y RH

[a] One cycle is 24 h.

[b] RH is between 45 % and 75 %.

[c] RH is between 95 % and 100 %.

Figure 2 — Temperature/humidity cycling

5.4.3.1.2 Requirement

After a minimum of 10 cycles, the fuse-links shall meet the requirements of the operating time rating test given in the applicable part of ISO 8820 and shall remain physically intact.

5.4.3.2 Resistance against temperature shock

5.4.3.2.1 Test

The fuse-links shall be subjected to 48 temperature shock cycles, as follows (see Figure 3):

a) 20 min at a temperature of (–40 ± 2) °C;

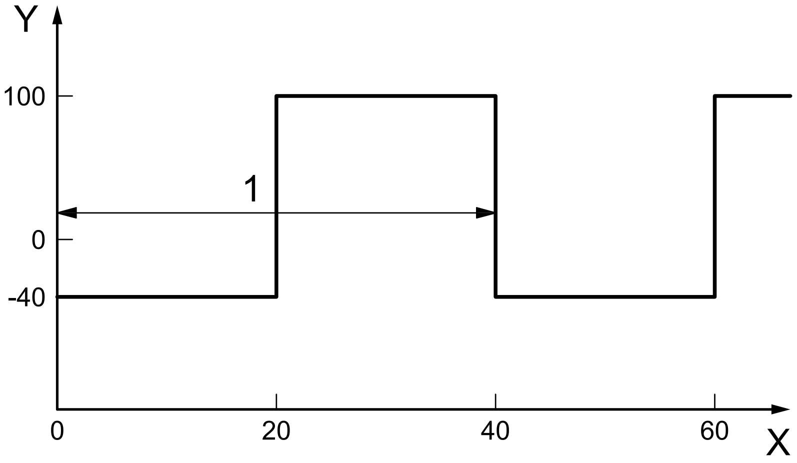
b) 15 s maximum transition time;

c) 20 min at a temperature of (100 ± 2) °C;

d) 15 s maximum transition time.

After completion of the test, the operating time-rating test shall be conducted in accordance with 5.5.

The cycle described in a) to d) above shall be completed in 40 min.



Key

X time, in min
Y temperature, in °C
1 one cycle

Figure 3 — Resistance against temperature shock

5.4.3.2.2 Requirement

After the test, the fuse-links shall remain physically intact.

5.4.4 Chemical loads

5.4.4.1 Purpose

This test evaluates the resistance to diesel fuel, “bio” diesel fuel, unleaded petrol (gasoline), brake fluid (DOT4), engine coolant water-glycol mixture 1:1, engine oil (multi-grade) and AUS32 (Urea) (see ISO 16750-5).

5.4.4.2 Test

Use a cotton cloth with a moistened area of each fluid type in succession. Wipe 5 times with a force of 5 N over the external portions of the fuse-links (see also IEC 60068-2-70).

5.4.4.3 Requirement

After the test, the marking of the fuse-links shall remain legible and colour coding shall remain recognisable.

5.5 Operating time rating

5.5.1 Purpose

This test evaluates the ability of the fuse-links to function when subjected to electrical overloads.

5.5.2 Test

Stabilize the test fixture and fuse-link at RT prior to testing. Adjust the power supply to the test current specified in the applicable parts of ISO 8820, then apply this current to the fuse-link. Repeat this procedure for each sample.

5.5.3 Requirement

The operating time of the fuse-link shall be within the limits given in the applicable parts ISO 8820. After the test, the current through the fuse-link shall not exceed the value specified in the appropriate part of ISO 8820 at the rated voltage.

5.6 Current steps

5.6.1 Purpose

This test evaluates the ability of the fuse-links' components to withstand the prolonged heating due to low level overloads.

5.6.2 Test

First apply a current equivalent in value to the rating of the fuse-link on test until it is temperature stabilized. Sequentially increase the current in steps of 2,5 % of the fuse-link current rating in intervals until it is temperature stabilized. The test ends when the fuse-element melts and the current is interrupted.

5.6.3 Requirement

After the current step test, the current through the fuse-link shall not exceed the value as specified in the appropriate part of ISO 8820 at the rated voltage. The fuse-link shall be removable from the test fixture by its intended method after returning to RT.

5.7 Breaking capacity

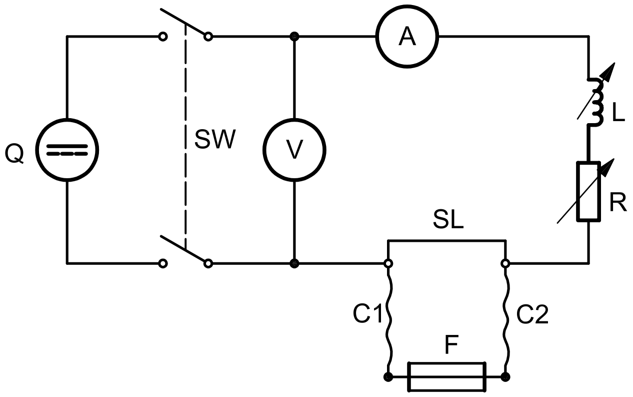
5.7.1 Purpose

This test evaluates the ability of the fuse-links to withstand the rated breaking current.

5.7.2 Test

The test circuit shall be in accordance with Figure 4. Connect a short circuit line or a dummy at point SL, close switch SW and adjust the d.c. current and the time constant of the circuit with the adjustable resistor R and/or the inductor L to I_B with a tolerance of $\left({}^{+5}_{\ 0}\right)$ %, and the time constant to (2,0 ± 0,5) ms. The voltage at the source Q shall be $U_R\left({}^{+2}_{\ 0}\right)$ V. Open switch SW and remove the short circuit line or the dummy.

Insert the fuse-link to be tested at point F and close the switch SW. Wait until the fuse-element melts and the current is interrupted. After interruption, maintain the supply voltage at U_R for 30 s and measure the remaining current. Open the switch SW and remove the fuse-link.



Key

A	ampere meter
C1, C2	test cables
F	fuse-link in test fixture
L	adjustable inductor
Q	power supply
R	adjustable resistor
SL	short circuit line/dummy
SW	switch
V	voltmeter

Figure 4 — Breaking capacity test circuit

5.7.3 Requirement

After the test, the current through the fuse-link shall not exceed the value as specified in the appropriate part of ISO 8820 at the rated voltage. In addition, particular attention shall be paid to the following:

- there shall be no permanent arcing;
- ruptures to the external surfaces shall not be visible to the naked eye;
- there shall be no welding together of the contacts or terminals;
- the fuse-link shall be removable in one piece from the test fixture by its intended method.

5.8 Strength of terminals

5.8.1 Purpose

This test evaluates the ability of the fuse-links to withstand mechanical stress during insertion and removal.

5.8.2 Test and requirements

See applicable part of ISO 8820.

6 Dimensions

See applicable part of ISO 8820.

(*Continued from second cover*)

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 8820-4 : 2002 Road vehicles Fuse-links — Part 4: Fuse-links with female contacts (Type A) and bolt-in contacts (Type B) and their test fixtures	IS 2577 (Part 4) : 2012 Road vehicles — Fuse-links: Part 4 Fuse-links with female contacts (Type A) and bolt-in contacts (Type B) and their test fixtures (*second revision*)	Identical
ISO 8820-5 : 2007 Road vehicles — Fuse-links — Part 5: Fuse-links with axial terminals (Strip fuse-links) Types SF 30 and SF 51 and test fixtures	IS 2577 (Part 5) : 2012 Road vehicles — Fuse-links: Part 5 Fuse-links with axial terminals (Strip fuse-links) Types SF 30 and SF 51 and test fixtures (*second revision*)	do
ISO 8820-6 : 2007 Road vehicles — Fuse-links — Part 6: Single-bolt fuse-links	IS 2577 (Part 6) : 2012 Road vehicles — Fuse-links: Part 6 Single-bolt fuse-links (*second revision*)	do
ISO 8820-7 : 2007 Road vehicles — Fuse-links — Part 7: Fuse-links with tabs (Type G) with rated voltage of 450 V	IS 2577 (Part 7) : 2012 Road vehicles — Fuse-links: Part 7 Fuse-links with tabs (Type G) with rated voltage of 450 V (*second revision*)	do

The technical committee has reviewed the provisions of the following International Standards referred in this adopted standard and has decided that they are acceptable for use in conjunction with this standard:

International Standard	*Title*
ISO 16750-3	Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 3: Mechanical loads
ISO 16750-5	Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 5: Chemical loads
IEC 60068-2-70	Environmental testing — Part 2: Tests — Test Xb: abrasion of marking and letterings caused by rubbing of fingers and hands

In order to protect the automobile electrical equipments against excessive currents, fuse-links are inserted. Owing to number of circuits and accessories, it might become necessary to insert fuse-links into each circuit depending on the load requirements. This standard is intended to cover such fuse-links for automobiles.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. BIS shall not be held responsible for identifying any or all such patent rights.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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This Indian Standard has been developed from Doc No.: TED 11 (748).

Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

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Published by BIS, New Delhi